Remarks

Claims 2-7, 11-13, 24, and 30-34 are presented for the Examiner's review and consideration. Claims 16 and 19 have been cancelled and claims 2-4, 6-7, 11-13, and 24 have been amended. Additionally, withdrawn claims 7, 8, 14 and 15 have been amended to change their dependency. Claims 1, 10, 16, 19, 23, and 25-29 have been cancelled. New claims 30-34 have been added. Applicants believe the claim amendments and remarks herein serve to clarify the present invention and are independent of patentability. No new matter has been added. Reconsideration and allowance of the pending claims in view of the above amendments and the following remarks is respectfully requested.

35 U.S.C. §101 Rejections

Claims 1-7, 10-13, 16, 19, and 23-28 were rejected under 35 U.S.C. §101 as being directed to non-statutory subject matter.

Specifically, the rejection stated that the claims are drawn to "*a method, a system and a computer program product for displaying of real world data by displaying a plurality of points in a phase space*" and to "*a method for displaying of financial data in a phase space*". Therefore, the Examiner asserts that "*the claimed invention is directed to a judicial exception to 35 U.S.C. 101 (i.e., an abstract idea, natural phenomenon, or law of nature) and is not directed to a practical application of such judicial exception because the claims do not require any physical transformation and the invention as claimed does not produce a useful, concrete, and tangible result*".

Applicants have cancelled independent claims 1, 23, 25, and 28. Therefore the rejection of these claims under 35 U.S.C. §101 have been rendered moot. However, Applicants have added new independent claims 30, 33, and 34.

With respect to the Examiners statement of "*It is not clear as to what is the utility of computing and displaying a point in space. The utility of the claimed invention is not specific, substantial and credible. It is not clear as to what is the specific, substantial and credible utility of "providing as an output of the electronic processor a display of the point(s) in phase space" or "enabling displaying of the sub-space on the medium selected…It is not clear as to what is the practical application of "providing as an output of the electronic processor a display of the point in phase space" or "enabling displaying of the sub-space on the medium selected*". New independent claims 30, 33, and 34 recite "outputting to a display on the Cartesian coordinate system the net change in value between each set of successive data samples within the sub-sequence s(*p)* of data samples $R_{t,t+1}(p)$ in relation to the scaled volatility of the sub-sequence s(*p)* of data samples $\overline{\sigma_{t_0,t_1}(p)} \cdot f$ to indicates to a user the scaled volatility between each set of successive data samples within the sub-sequence s(*p)* of data samples".

Therefore, the independent claims clearly show utility and a practical application associated therewith.

The Examiner also states:

> "*For an invention to produce a "concrete" result, the process must have a result that can be substantially repeatable or the process must substantially produce the same result again. In re Swartz, 232 F.3d 862, 864, 56 USPQ2d 1703, 1704 (Fed. Cir. 2000) (where asserted result produced by the claimed invention is "irreproducible" claim should be rejected under section 101). The opposite of "concrete" is unrepeatable or unpredictable. There is no useful, concrete and tangible result produced from implementing the steps of the claimed invention.*"

The Applicants are unsure as to how the Examiner can assert that the present invention as recited for the cancelled independent claims does not produce a concrete and tangible result. The Examiner states that for an invention to be "concrete" the process must have a result that can

be substantially repeatable or produce substantially the same result again. With respect to the cancelled independent claims if the same variables are plugged into the equations, the same results occur every time. These results are displayed in the same way as well. This is also true with respect to the new independent claims as well. The Examiner did not provided any indication as to why the Examiner thinks that repeatable results were not possible with the cancelled independent claims. Applicants request that if the Examiner has any outside knowledge as to how the above equations do not produce the same results when identical values are used for the variables, to present this outside knowledge to the Applicants.

In light of the foregoing, the new independent claims are directed to non-abstract ideas and include a tangible result. Applicants respectfully request reconsideration and withdrawal of the 35 U.S.C. §101 rejections.

35 U.S.C. §112 Rejections

Claims 1-7, 10-13, 16, 19, and 23-27 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

In particular, the Examiner states “Independent claims recites the limitation "determining and storing with the electronic processor a first and a second coordinate value of a point in phase space based on the volatility and the net change". However it is not clear if the first coordinate value is based on volatility or scaled volatility. If it is based on unsealed volatility, it is not clear what is the purpose of scaling the volatility.

Claims 1, 10, 16, 19, 23, and 25-29 have been cancelled, thereby rendering the rejection of these claims under 35 U.S.C. §112, second paragraph, moot. However, as discussed above, Applicants have added new independent claims 30, 33, and 34.

Applicants point out to the Examiner that the new independent claims recite "scaling with a scale factor *f* the standard deviation $\overline{\sigma_{t_0,t_1}(p)}$ of the sub-sequence s(*p*) of data samples to derive a scaled volatility of the sub-sequence s(*p*) of data samples $\overline{\sigma_{t_0,t_1}(p)} \cdot f$, the scale factor *f* being dependent on a length of the sub-sequence s(*p*)".

In light of the foregoing, Applicants respectfully submit that the rejection under 35 U.S.C. §112 has been overcome and should be withdrawn.

35 U.S.C. §103 Rejections

Claims 1-7, 10-13, 16, 19, and 23-28 were rejected under 35 U.S.C. §103(a) as being unpatentable over Stewart (US Patent 6,195,103 B1). In response, Applicants respectfully submit that this rejection should be withdrawn.

Applicants have cancelled claims 1, 10, 16, 19, 23, and 25-29, thereby rendering the rejection of these claims 35 U.S.C. §103(a) moot. However, Applicants have added new independent claims 30, 33, and 34.

The following is a brief overview of the presently claimed invention that was originally given in the previous Response With Amendment. The presently claimed invention relates to a method and computer system for computing and displaying a phase space, and more particularly, a method and computer system for the analysis and visualization of data, in particular with respect to financial data, such as stock market data. (Abstract).

The presently claimed invention can be applied for the analysis and visualization of data samples from the fields of sociology, such as data from opinion polls, or even for comparison of the relative performance of football-teams. (¶[0051]). Furthermore, the invention is not restricted to data samples covering a specific period of time. Especially for data samples obtained from the

fields of physical experiments and technology, the series of the data samples can also span other dimensions like length, energy or speed. (¶[0052]).

The presently claimed invention is advantageous in that it enables valuation of the volatility versus the development of the observed variable over a specific period. (¶[0007]). In the case of financial data this enables relating the return to the volatility, such as for the comparison of the characteristics and performance of financial and stock market values. (Id). According to one embodiment the relation of the return and the volatility is displayed in a phase space. (¶[0008]).

Further the presently claimed invention enables computation of a curve in the phase space. The points of the curve are calculated based on consecutive sub-sequences of the sequence of data samples. In the case of stock market data, a logarithmic grid is preferably used for determining the sub-sequences. (¶[0010]). This is of particular advantage for stock market data. For many stock values the volatility scales as the square root of time. (¶[0011]). This is compensated for through use of the logarithmic grid. (Id).

FIG. 3 of the presently claimed invention shows an example of a display of the phase space with a corresponding sub-space. The phase space is defined by a coordinate system. The x-axis of the coordinate system is the scaled volatility and the y-axis is the return R. (¶[0073]). This way the relative performance and the differences in the quality of the stocks being considered become apparent. (¶[0075]).

An additional curve 3a delimits a further sub-space corresponding to a choice of a probability threshold... (¶[0078]). In essence the display shown in accordance with FIG. 3 enables intuitively comparing the relative performances and quality of a portfolio of stocks over an arbitrarily chosen time frame. (¶[0082]).

Thus the presently claimed invention enables an intuitive comparison of both volatility and return, for a variety of possible parameters, measured against a variety of possible dimensional

values, where the result is adjusted so that the displaying is effective for different time periods. The calculations for volatility and return are different, and generate a more meaningful result than the prior art, especially Stewart. Further, the form of display intuitively conveys more information than in the prior art.

Applicants have added new independent claims 30, 33, and 34, which similarly recite:

> selecting a successive sub-sequence s(*p*) of data samples for analysis in a set S of data samples s(*p*): = (p_{t0}, . . . , p_{tI});
>
> calculating a standard deviation $\overline{\sigma_{t_0,t_1}(p)}$ of the sub-sequence s(*p*) of data samples to derive an unscaled volatility thereof;
>
> scaling with a scale factor *f* the standard deviation $\overline{\sigma_{t_0,t_1}(p)}$ of the sub-sequence s(*p*) of data samples to derive a scaled volatility of the sub-sequence s(*p*) of data samples $\overline{\sigma_{t_0,t_1}(p)} \cdot f$, the scale factor *f* being dependent on a length of the sub-sequence s(*p*);
>
> calculating a net change in value $R_{t,t+1}(p)$ between each set of successive data samples within the sub-sequence s(*p*) of data samples;
>
> mapping to a Cartesian coordinate system with a first axis representing the net change in value between each set of successive data samples within the sub-sequence s(*p*) of data samples $R_{t,t+1}(p)$ and a second axis representing the scaled volatility of the sub-sequence s(*p*) of data samples $\overline{\sigma_{t_0,t_1}(p)} \cdot f$; and
>
> outputting to a display on the Cartesian coordinate system the net change in value between each set of successive data samples within the sub-sequence s(*p*) of data samples $R_{t,t+1}(p)$ in relation to the scaled volatility of the sub-sequence s(*p*) of data samples $\overline{\sigma_{t_0,t_1}(p)} \cdot f$ to indicates to a user the scaled volatility between each set of successive data samples within the sub-sequence s(*p*) of data samples.

Support for this amendment can be found in the Pre-Grant Publication 2002/0165810 at, for example, FIGs. 1-3 and 5-6 and at paragraphs [0007]-[0008], [0012], [0055], [0057]-[0059], and [0065]-[0082]. No new matter has been added.

With respect to claim 1 (and similarly claims 23 ad 25), the Examiner states that Stewart teaches:

> scaling and storing with the electronic processor the volatility with a factor, the factor being dependent on the length of the first sequence (See Column 3 line 32 — Column 6 line 45, multiplying distance by scale factor, for instance in the computation of the standard deviation the factor is dependent on the length of the sequence); calculating and storing with the electronic processor a net change in the data as a difference between data samples within the sequence, in accordance with the formula stated in the claim (See Column 6 lines 54-65, the disclosed by Stewart is the same as the one stated by the applicant).

However, the scaling factor of the presently claimed invention is "dependent on the length of the sequence". Furthermore, dependent claim 2 states that "the factor is related to the square root of the length of the sequence", e.g., $f=\sqrt{(t_1-t_0)}$. Nowhere does Stewart teach or suggest these elements.

For example, Stewart explicitly teaches:

> a scaling factor s may be chosen so that when multiplied by D most values of sD fall in the range 0 through 6. The value of s will depend on the average magnitude of the fluctuations $x(t_i)$. While it is possible to determine a value of s for each time series, it is often more useful to use a fixed values of s for all time series in the same category. Thus one value of s would be used for daily returns of NYSE stocks, another value of s for daily returns of NASDAQ stocks, and yet another value for the 5-minute returns of NASDAQ stocks. In each case s would be chosen so that most values of sD (over all relevant times and all instruments in a category) lie in the range 0 to 6, and ideally with roughly 17% of all values lying in the range from 5 to 6.

Stewart also teaches that "multiplies 206 the distance D by a scaling factor s appropriate to the category of data".

As can be seen, Stewart selects a scaling factor based on the average magnitude of the fluctuations $x(t_i)$ and the category of data. This is not the same as the scaling factor being "dependent on the length of the sequence" as recited for the independent claims or being "related to the square root of the length of the sequence", e.g., $f=\sqrt{(t_1-t_0)}$, as recited for dependent claim 2.

Furthermore, nowhere does Stewart teach or suggest "calculating a net change in value $R_{i,f+1}(p)$ between each set of successive data samples within the sub-sequence $s(p)$ of data samples".

Accordingly, the presently claimed invention distinguishes over Stewart for at least these reasons.

The Examiner correctly states Stewart does not explicitly teach:

> the formulas used in the calculating step and the steps of determining and storing with the electronic processor a first and a second coordinate value of a point in phase space based on the volatility and the net change; and providing as an output of the electronic processor a display of the point in phase space.

However, the Examiner takes Official notice these steps are old and well known in the financial art. In particular, the Examiner states:

> The formulas recited in the claims are old and well known formulas for computing the variance and mean values of a sequence in continuous time. For instance computing the expected return and variance of a security and plotting in the mean-variance space has been in vogue at least for the last three decades. This plot helps in the selection of securities according one's risk-return preferences.

Applicants request that the Examiner provide patents and/or publications or file an affidavit as is allowed under MPEP §707 to support the Examiner's user of Official Notice.

MPEP §2144.03 states "If the applicant traverses such an assertion the examiner should cite a reference in support of his or her position." If, however, the Examiner's statements are based on facts within the personal knowledge of the Examiner, the Applicants respectfully request that the Examiner support these references by filing an affidavit as is allowed under MPEP §707, citing 37 CFR 1.104(d)(2), and as specified in MPEP §2144.03. See, MPEP §2144.03, "When a rejection is based on facts within the personal knowledge of the examiner, the data should be stated as specifically as possible, and the facts must be supported, when called for by the applicant, by an affidavit from the examiner."

With respect to dependent claims 2-7, 10-13, 24, and 26-27, the Examiner merely gives the following statement in support of the rejection of these claims: "the features in these claims are either disclosed by Stewart or are old and well known. The inclusion of these features would help make the computation more robust and efficient." **Once again, Applicants respectfully request that if Examiner's statements are based on facts within the personal knowledge of the Examiner, Applicants respectfully request that the Examiner support these facts by filing an affidavit as is allowed under MPEP §707 citing 37 CFR 1.104(d)(2). Applicants also respectfully requests that the Examiner particularly point out where in Stewart these claims are taught and/or provide references to support this statement.**

For example, with respect to dependent claim 2, nowhere does Stewart teach or suggest "wherein the factor is related to the square root of the length of the sequence" for the reasons stated above. Accordingly, the presently claimed invention distinguishes over Stewart for at least these reasons as well.

With respect to dependent claim 4, nowhere does Stewart teach or suggest:

> calculating a probability distribution of the net change;
> determining a probability threshold value; and
> determining a region within the Cartesian coordinate system associated with the probability distribution and the probability threshold value.

Accordingly, the presently claimed invention distinguishes over Stewart for at least these reasons as well.

With respect to dependent claim 5, nowhere does Stewart teach or suggest "wherein the probability distribution is a gaussian distribution". Accordingly, the presently claimed invention distinguishes over Stewart for at least these reasons as well.

With respect to dependent claim 6, nowhere does Stewart teach or suggest "wherein the probability threshold value is equal to one of the standard deviation and the standard deviation times an integer value". Accordingly, the presently claimed invention distinguishes over Stewart for at least these reasons as well.

With respect to dependent claim 7, nowhere does Stewart teach or suggest "wherein the region has the form of one of a cone and the projection of a cone". Accordingly, the presently claimed invention distinguishes over Stewart for at least these reasons as well.

With respect to dependent claim 11, nowhere does Stewart teach or suggest "displaying a boundary of the region within the Cartesian coordinate system". Accordingly, the presently claimed invention distinguishes over Stewart for at least these reasons as well.

With respect to dependent claim 12, nowhere does Stewart teach or suggest "displaying a number of K frames FRj, each of the frames FRj visualizing one of a corresponding set of points

p0 to pi and a sub-set of the set of points". Accordingly, the presently claimed invention distinguishes over Stewart for at least these reasons as well.

With respect to dependent claim 13, nowhere does Stewart teach or suggest "decreasing the brightness and/or contrast of a set of points displayed on the first axis and the second axis, wherein the set of points indicate the net change in value between each set of successive data samples". Accordingly, the presently claimed invention distinguishes over Stewart for at least these reasons as well.

With respect to dependent claim 24, nowhere does Stewart teach or suggest:

> wherein the mapper is further adapted to determine a region within the Cartesian coordinate system in which a point is situated with a probability being equal to a predetermined probability value, the determination of the sub-space being made responsive to the predetermined probability value and a probability distribution.

Accordingly, the presently claimed invention distinguishes over Stewart for at least these reasons as well.

Accordingly, Applicants believe that the rejection under 35 U.S.C. § 103 has been overcome and respectfully request that this rejection be withdrawn. Therefore, Applicants respectfully submits that the rejection of claims 1-7, 10-13, and 23-28 have been overcome and should be withdrawn.

Conclusion

The foregoing is submitted as a full and complete response to the Official Action mailed November 5, 2008, and it is suggested that Claims 1-7, 11-13, 24, and 30-34 are in condition for allowance. Reconsideration of the rejection is requested. Allowance of Claims 1-7, 11-13, 24, and 30-34 is earnestly solicited.

No amendment made was related to the statutory requirements of patentability unless expressly stated herein. No amendment made was for the purpose of narrowing the scope of any claim, unless Applicants have argued that such amendment was made to distinguish over a particular reference or combination of references.

Applicants acknowledge the continuing duty of candor and good faith to disclose information known to be material to the examination of this application. In accordance with 37 CFR § 1.56, all such information is dutifully made of record. The foreseeable equivalents of any territory surrendered by amendment are limited to the territory taught by the information of record. No other territory afforded by the doctrine of equivalents is knowingly surrendered and everything else is unforeseeable at the time of this amendment by the Applicants and the attorneys.

If the Examiner believes that there are any informalities that can be corrected by Examiner's amendment, or that in any way it would help expedite the prosecution of the patent application, a telephone call to the undersigned at (305) 830-2600 is respectfully solicited.

The Commissioner is hereby authorized to charge any fees that may be required or credit any overpayment to Deposit Account No. 500601 (Docket No. 739-X01-005).

In view of the preceding discussion, it is submitted that the claims are in condition for allowance. Reconsideration and re-examination are requested. Respectfully submitted,

Respectfully submitted,

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